C. Water supply for area. (CHECK ONE)

1. Surface intakes (locate on attached map)
2. Municipal wells (locate on attached map)
3. Domestic wells:

a. Approximate number within ¼ mile. 14 (see attached note)
b. Locate a minimum of 3 wells on attached map and list below:

Property owner	_____	_____	_____
Address	_____	_____	_____
Phone No.	_____	_____	_____
Well records available	YES___ NO___	YES___ NO___	YES___ NO___
Odor problems	YES___ NO___	YES___ NO___	YES___ NO___
Taste problems	YES___ NO___	YES___ NO___	YES___ NO___

c. If odor or taste problems are reported please elaborate: _____

No odor or taste problems reported. Wells are not for domestic use.

D. Are surface or subsurface, (leachate), drainage areas from site apparent? YES___ NO___. If yes: see note to IV-C

1. Were unusual odors or stains noted? YES___ NO *
2. Was stressed vegetation noted? YES___ NO *

a. If yes please note area on map.

E. Are streams or receiving waters adjacent to site? YES* NO___
If yes, list observations: (i.e.-change in benthic community, change in plant density/diversity, change in color, siltation, etc.). _____

Exxon has docking, pumping and storage facilities situated adjacent to the Patapsco River (Inner Harbor). There is nothing unusual about the river at this location.

F. Site topography: (i.e.-plateau, strip mine ravines, etc.). _____

The site is partially constructed on artificial fill and abuts and is underlain with the Patuxent formation. The site is a flat coastal plain.

G. Other observations: (i.e.-erosion, located in flood plain, etc.). _____

None

V. Were photographs taken? YES____ NO___*
If yes: Who has custody of photos?

Name:_____

Agency:_____

Phone No.:_____

VI. Is a hydrogeological survey for this site attached? YES____ NO *
If no, Section III D of EPA Form T2070-2 must be completed.

VII. Please attach pertinent copies of reports or data reviewed by inspector: (i.e.-State monitoring data, consultant reports, etc.).

VIII. Name of Inspector: Michael M. Broumberg

Agency: Waste Management Administration, Office of Environmental Programs, Department of Health and Mental Hygiene

Phone No.: 301-383-6650

Time on Site: September 28, 1983 0930 hours

Weather Conditions: Sunny and clear Temp. 70°F

NOTES TO FIELD TRIP SUMMARY

III. Additional contact was Fred Anderson, Houston Petroleum Marketing Environmental Group (713)-591-9237. Mr. Anderson was assigned to the Baltimore Terminal during the construction of Interstate 95. He related that portions of the refinery were located where the Interstate stands. During demolition and excavation of the Interstate during 1977, no hazards were evidenced concerning the ground.

IV-C. There are no surface intakes, municipal or domestic wells within 1/4 mile of the site. Approximately four years ago, during various construction programs at the site, Exxon experienced problems with oil seepage from the ground. Wells were installed to control and recover any underground oil present. Presently, seven wells are operational and have recovered 103,210 gallons of oil through the first quarter of 1983. Water is discharged through various separators on the site. State Discharge Permit No. 83-DP-0215 covers this discharge.

R.M. Graham offered the following information: while employed at the Exxon Dundalk terminal facility (Dundalk and Gusryan Streets) (property presently owned by Baltimore City), he routinely witnessed weathering and burial of tank sediments. It was the usual practice to place tank bottoms on the ground surface of the dike areas and let the material weather for several months. A "danger" sign was customarily erected. Weathered sediments were "discharged" into the soil. Mr. Graham also stated that it was refinery practice to burn almost all waste products because of the economic incentives involved in producing heat used in the plant process.

B. PERFORMANCE OF A PRELIMINARY ASSESSMENT

1. Background Information Review

a. Hydrology

1. Fault Zone N/A
2. Karst Zone N/A
3. 100 Yr. Flood Plain See attached map
4. Regulated Floodway N/A
5. Wetland N/A
6. Recharge Zone N/A
7. Soil Characteristics Arundel formation - clay facies 0.5 to 10 meters thick. Immediate shoreline is artificial fill.
8. Direction of GW/SW Flow Surface water enters storm drains and are discharged to Patapsco River. GW is an unconsolidated aquifer.
9. Depth to Ground Water Varies 200-300 feet
10. Use of GW 14 oil recovery wells are installed on Exxon property.
11. Aquifer Yield N/A
12. Distance to GW/SW Use On site
13. Recharge/Discharge Area N/A
14. Site Slope Flat coastal plain 0-5^{o} slope
15. SW Intakes N/A

b. Flora/Fauna

1. Endangered Species N/A

2. Indicator Species N/A

3. Critical Habitat N/A

c. Site History

1. State/Local Chronology of Events

See summary

2. Permits

a. NPDES 83-DP-0215

b. SPCC Plan Submitted with oil operations permit

c. State Permits None

d. Air Permits Gasoline terminal X00063-00092
Boiler X00063-00115-00116-00117
Asphalt X00063-00624

3. Legal Action

N/A

4. Sampling Results

N/A

d. Known or Alleged Hazards

1. Illness Clusters None

2. Cancer Studies None

3. Helath Dept. Records None

4. Fish Kills None

5. Worker/Non-worker Injury None

2. Administrative Information

a. Facility Name Exxon Company, USA

b. Address 3801 Boston Street, Baltimore, MD 21224

c. Latitude 76 ° 34"00 ' / longitude 39 ° 16" 36'

d. Responsibile Party

1. Owner Exxon Company, USA, P.O. Box 1280, Houston, Texas 77001

2. Realty Company N/A

3. Generators N/A

e. Type of Operation

1. Generator

a. Waste Type/Source/Amount Leaded tank bottoms from tank cleaning operation. Amounts unknown

b. Waste Disposition Weathered and buried on site

2. Storage N/A

3. Treatment/Disposal N/A

a. Incineration

b. Landfill

c. Landfarm

d. Biological Treatment

e. Chemical Treatment

f. Deep Well Injection

g. Surface Impoundment

h. Other

f. Site Activity Status

1. Active _____

2. Inactive X

g. Personnel Present During Inspection

1. Name Richard Nock / Sid Schenning / R.M. Graham

2. Address (all) 3801 Boston Street, Baltimore, MD 21224

3. Work Phone (all) - (301)-563-5118 /

4. Title Terminal Mgr. / Terminal Supt. /Terminal Engr.

h. Inspection Information

1. Access

a. Warrant _____

b. Permission by Mr. Nock

2. Photographs

a. Permitted X

b. Prohibited _____

c. Other _____

3. Field Evaluation

a. Evidence of Contamination

1. Soil None

2. Runoff None

3. Spills None

4. Air Emmissions None

5. Erosion None

6. Ponding None

7. Charred Areas None

b. Maintainance, operation of run-off collection and control systems

Refer to appended oil recovery well production summary

c. Demographics (Refer to Field Trip Summary Report, Section IV., Site Observations.

WELLS WITHIN MILE EXXON REFINERY SITE

EXXON COMPANY, U.S.A. - BALTIMORE TERMINAL

OIL RECOVERY WELL SYSTEM
MONTHLY OIL PRODUCTION SUMMARY

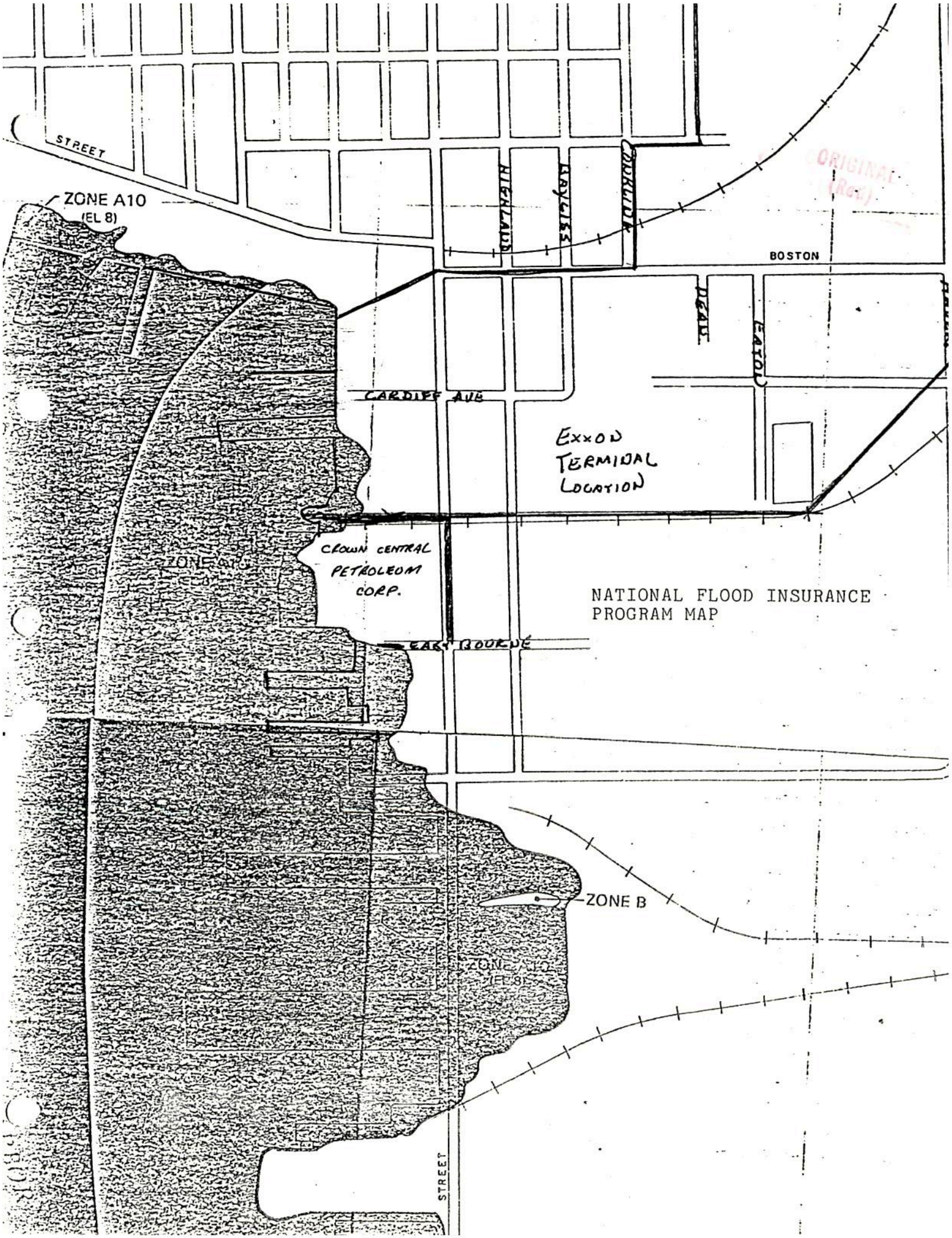
1ST QUARTER, 1983

(GALLONS OF OIL RECOVERED)

ACTIVE WELL NO.	CUMULATIVE TOTAL VOLUME RECOVERED (END OF 4TH QTR. 1982)	MONTHLY BREAKDOWN - 1ST QTR., 1983			CUMULATIVE TOTAL VOLUME RECOVERED (END OF 1ST QTR. 1983)
		JANUARY	FEBRUARY	MARCH	
1*	24,442	248	42	2	24,734
2**	1,193	25	23	0	1,241
5	18,489	883	-478	492	20,342
6	13,141	318	291	346	14,096
7	4,127	323	20	166	4,636
8	26,440	1,470	1,088	4,228	33,226
9	4,214	471	170	80	4,935
TOTALS	92,046	3,738	2,112	5,314	103,210

* Well #1 is presently out-of-service.

** Well #2 is in service, but oil production was negligible in March, 1983.


STREET
ZONE A10
(EL 8)
HIGHLAND
BAYLISS
BOURDE
BOSTON
DEAN
EATON
CARDIFF AVE
EXXON
TERMINAL
LOCATION
CROWN CENTRAL
PETROLEOM
CORP.
NATIONAL FLOOD INSURANCE
PROGRAM MAP
EAST BOURNE
ZONE B
STREET


BALTIMORE
Collington Square
St Katharines Convent
Patrick Henry Sch
St Alphonsus Cemetery
Armistead Gardens Sch
Armistead Gardens
Orangeville
Tilghman Sch
Johns Hopkins Hospital
Paca Sch
Vocational Sch
John Rodgers Sch
St Elizabeth Sch
Patterson Park Jr-Sr High Sch
Pound House
PATTERSON PARK
Highlandtown Sch
Hampstead Hill Jr High Sch
Highlandtown
Holy Rosary Sch
Patterson Sch
Fell Sch
Canton Sch
Canton
Ithiriah Sch
Mt Carmel Cemetery
Baltimore City Hospitals
Water
Radio Towers
Feils Point
Locust Pt
NORTHWEST HARBOR
Exxon
Crown Central Pet. Corp.
Oil
Canton Yard
Latrobe Park
BM 22
BM 31
Light
Fort McHenry
Fort
Whetstone Pt
Substation
Lazaretto Point
Canton
Point Breeze
PATAPSCO RIVER
FERRY BAR CHANNEL (EAST SECTION)
USGS
BALTIMORE, EAST, MD.
SE/4BALTO. 15' QUAD.
N3915 - w7630/7.5

A Preliminary Assessment of Exxon Company, USA 3801 Boston Street Baltimore, Maryland 21224

MD 91

Draft Report
December 1983

Prepared by: Maryland Waste Management Administration
201 West Preston Street
Baltimore, Maryland 21201

For: U.S. Environmental Protection Agency
Region III
Sixth and Walnut Streets
Philadelphia, Pennsylvania 19106

Exxon Company, USA
3801 Boston Street
Baltimore, Maryland 21224

Table of Contents

Summary and Recommendations

Summary

Exxon Company USA operated one of the first oil refineries in the country on the Boston Street site. The refinery operated from 1865 to 1965 when operations were discontinued and the site was converted to a storage depot and terminal. An asphalt plant continues to be active on the site.

All refinery equipment and buildings were torn down over the past 15 years, especially in that area of Interstate 95 construction. However, the westernmost portion of the site south of Boston Street, down to Danville Avenue (a nonexisting paper street) contains original refinery storage tanks.

The oldest existing storage tank dating from 1903 has recently been torn down. An inspection of the ground and soil under and adjacent to the demolished tank did not indicate burial of tank bottoms. The Exxon property has undergone much demolition, construction, reconstruction, etc. over the past 100 years. Exxon affirms that waste materials were weathered and buried throughout the refinery and terminal site during its operation, but is unable to estimate quantity or location.

Recommendations

This facility is considered a low priority site for a site investigation to determine what wastes remain on site.

ATTACHMENT B

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION
01 STATE: MD | 02 SITE NUMBER:

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER				
Exxon Company, USA - Baltimore Terminal	3801 Boston Street				
03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Baltimore	MD	21224	Baltimore City		
09 COORDINATES LATITUDE: 39° 16' 36"	LONGITUDE: 76° 34' 00"				

ORIGINAL

10 DIRECTIONS TO SITE (Starting from nearest public road)
From intersection of Clinton and Boston Streets, proceed east on Boston Street to 3801 Boston Street (terminal entrance)

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)		
Exxon Company, USA	P.O. Box 1280		
03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
Houston	TX	77001	(713) 656-3636
07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)		
Exxon Company, USA	P.O. Box 1280		
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Houston	TX	77001	(713) 656-3636

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ B. UNCONTROLLED WASTE SITE (CERCLA 103c) DATE RECEIVED: 1, 4, 81 (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☒ YES DATE 9, 28, 83 (MONTH DAY YEAR) ☐ NO

02 (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)	03 YEARS OF OPERATION	
☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN	1865 (BEGINNING YEAR)	1965 (ENDING YEAR) ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
Separator Sludge (K051)
Slop Oil Emulsions (K049)
Leaded Tank Bottoms (K052)
Heat Exchanger Bundle Cleaning Sludge (K050)

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
There is potential for ground water and surface water contamination

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)		03 TELEPHONE NUMBER
Barry W. Hutchins	Exxon Company, USA		(713) 656-6138
04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael M. Broumberg	DHMH OEP	WMA	(301) 383-6650	12/30/83 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
MD	

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- XX C. SLUDGE
- ☐ D. OTHER Emulsion (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS
- CUBIC YARDS Unknown
- NO. OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)

- XX A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- XX G. FLAMMABLE
- XX H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		
OLW	OILY WASTE	Unknown		
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SLU	Separator Sludge	78-00-02	Weathering & Burial	Unknown	
SLU	Tank Bottoms	78-00-02	Weathering & Burial	Unknown	
SLU	Heat Exchanger Sludge	7440-47-3	Weathering & Burial	Unknown	
Olw	Slop Oil Emulsion	7440-47-3	Weathering & Burial	Unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: MD | 02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 XX A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
As reported by Exxon, a hazardous material was buried on site

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 XX E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: Unkonwn
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 XX F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: Unknown (Acres)
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 XX H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE: MD	02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
(Spills/runoff/standing liquids/leaking drums)
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☒ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

See "A"

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

CERCLA Report

EPA FORM 2070-12 (7-81)

FIELD TRIP SUMMARY REPORT

This summary should be prepared in conjunction with the Preliminary Assessment Form, (EPA Form T2070-2), so that a proper site rating can be assigned.

Name of Site Exxon Company, USA, Boston Street Terminal

EPA Case Number _____

I. If site is active, has owner/operator notified EPA in accordance with Section 3010 of RCRA. Yes _____ No _____

If Yes: a) Note EPA I.D. No. Site is inactive

b) Is the site a generator, storer, treater or disposer of hazardous waste? (CIRCLE ONE).

II. If the answers submitted in Part VI (Hazard Description) of EPA Form T2070-2 or observations warrant a more thorough site investigation/sampling, please attach a sketch map showing those areas of concern. (i.e.: lagoons, leachate seeps, drum storage, monitoring wells, etc.). Site map included in this report.

III. Please list site contacts and accompanying inspectors; include name, title and phone numbers. Richard Nock, Terminal Manager (301)-563-5118

Sid Schenning, Terminal Supt.

R.M. Graham, Engineer

All contacted 9/28/83

IV. Site observations: (attach a topo map). USGS 7½ map attached

A. Population within 1000 ft. of the site is (CHECK ONE)

1. 0-10 people Three people reside at 1603 S. Clinton Street
2. 10-100 people
3. greater than 100 people Workplace population exceeds 100

B. List surrounding land use: (woodlot, agricultrual, playground, industrial,etc.)

North: Industrial - Exxon tank farm

South: Industrial - open field

East: Rt 95 - Exxon tank farms

West: one residence, one restaurant and Petroleum Fuel and Terminal Corporation.

ATTACHMENT B

METHODS OF DISPOSING OF SLUDGE FROM LEADED GASOLINE STORAGE TANKS

H. K. BALL

ETHYL CORPORATION

Exxon Company, USA
3801 Boston Street
Baltimore, Maryland 21224

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EPA

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Exxon Company, USA	P.O. Box 1280		
09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
Houston	TX	77001	(713) 656-3636

13 TYPE OF OWNERSHIP (Check one)
☒ A. PRIVATE ☐ B. FEDERAL: _____ (Agency name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☐ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☒ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: 1/4/81 (MONTH DAY YEAR) ☐ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON-SITE INSPECTION
☒ YES DATE 9/28/83 (MONTH DAY YEAR) ☐ NO

02 (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☒ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)	03 YEARS OF OPERATION	
☐ A. ACTIVE ☒ B. INACTIVE ☐ C. UNKNOWN	1865 (BEGINNING YEAR)	1965 (ENDING YEAR) ☐ UNKNOWN

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Separator Sludge (K051)
Slop Oil Emulsions (K049)
Leaded Tank Bottoms (K052)
Heat Exchanger Bundle Cleaning Sludge (K050)

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There is potential for ground water and surface water contamination

V. PRIORITY ASSESSMENT

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☐ B. MEDIUM (Inspection required) ☒ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed, complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)		03 TELEPHONE NUMBER
Barry W. Hutchins	Exxon Company, USA		(713) 656-6138
04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Michael M. Broumberg	DHMH OEP	WMA	(301) 383-6650	12/30/83 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

FIELD TRIP SUMMARY REPORT

This summary should be prepared in conjunction with the Preliminary Assessment Form, (EPA Form T2070-2), so that a proper site rating can be assigned.

Name of Site Exxon Company, USA, Boston Street Terminal

EPA Case Number _____

I. If site is active, has owner/operator notified EPA in accordance with Section 3010 of RCRA. Yes _____ No _____

If Yes: a) Note EPA I.D. No. Site is inactive

b) Is the site a generator, storer, treater or disposer of hazardous waste? (CIRCLE ONE).

II. If the answers submitted in Part VI (Hazard Description) of EPA Form T2070-2 or observations warrant a more thorough site investigation/sampling, please attach a sketch map showing those areas of concern. (i.e.: lagoons, leachate seeps, drum storage, monitoring wells, etc.). Site map included in this report.

III. Please list site contacts and accompanying inspectors; include name, title and phone numbers. Richard Nock, Terminal Manager (301)-563-5118

Sid Schenning, Terminal Supt.

R.M. Graham, Engineer

All contacted 9/28/83

IV. Site observations: (attach a topo map). USGS 7½ map attached

A. Population within 1000 ft. of the site is (CHECK ONE)

1. 0-10 people Three people reside at 1603 S. Clinton Street
2. 10-100 people
3. greater than 100 people Workplace population exceeds 100

B. List surrounding land use: (woodlot, agricultrual, playground, industrial, etc.)

North: Industrial - Exxon tank farm

South: Industrial - open field

East: Rt 95 - Exxon tank farms

West: one residence, one restaurant and Petroleum Fuel and Terminal Corporation.

C. Water supply for area. (CHECK ONE)

1. Surface intakes (locate on attached map)
2. Municipal wells (locate on attached map)
3. Domestic wells:

a. Approximate number within ¼ mile. 14 (see attached note)
b. Locate a minimum of 3 wells on attached map and list below:

Property owner _____ _____ _____

Address _____ _____ _____

Phone No. _____ _____ _____

Well records available	YES___	NO___	YES___	NO___	YES___	NO___
Odor problems	YES___	NO___	YES___	NO___	YES___	NO___
Taste problems	YES___	NO___	YES___	NO___	YES___	NO___

c. If odor or taste problems are reported please elaborate: _____

No odor or taste problems reported. Wells are not for domestic use.

D. Are surface or subsurface, (leachate), drainage areas from site apparent? YES___ NO___. If yes: see note to IV-C

1. Were unusual odors or stains noted? YES___ NO *
2. Was stressed vegetation noted? YES___ NO *

a. If yes please note area on map.

E. Are streams or receiving waters adjacent to site? YES* NO___
If yes, list observations: (i.e.-change in benthic community, change in plant density/diversity, change in color, siltation, etc.). _____

Exxon has docking, pumping and storage facilities situated adjacent to the Patapsco River (Inner Harbor). There is nothing unusual about the river at this location.

F. Site topography: (i.e.-plateau, strip mine ravines, etc.). _____

The site is partially constructed on artificial fill and abuts and is underlain with the Patuxent formation. The site is a flat coastal plain.

G. Other observations: (i.e.-erosion, located in flood plain, etc.). _____

None

V. Were photographs taken? YES____ NO___*
If yes: Who has custody of photos?

Name:_____

Agency:_____

Phone No.:_____

VI. Is a hydrogeological survey for this site attached? YES____ NO *
If no, Section III D of EPA Form T2070-2 must be completed.

VII. Please attach pertinent copies of reports or data reviewed by inspector: (i.e.-State monitoring data, consultant reports, etc.).

VIII. Name of Inspector: Michael M. Broumberg

Agency: Waste Management Administration, Office of Environmental Programs,
Department of Health and Mental Hygiene

Phone No.: 301-383-6650

Time on Site: September 28, 1983 0930 hours

Weather Conditions: Sunny and clear Temp. 70°F

NOTES TO FIELD TRIP SUMMARY

III. Additional contact was Fred Anderson, Houston Petroleum Marketing Environmental Group (713)-591-9237. Mr. Anderson was assigned to the Baltimore Terminal during the construction of Interstate 95. He related that portions of the refinery were located where the Interstate stands. During demolition and excavation of the Interstate during 1977, no hazards were evidenced concerning the ground.

IV-C. There are no surface intakes, municipal or domestic wells within 1/4 mile of the site. Approximately four years ago, during various construction programs at the site, Exxon experienced problems with oil seepage from the ground. Wells were installed to control and recover any underground oil present. Presently, seven wells are operational and have recovered 103,210 gallons of oil through the first quarter of 1983. Water is discharged through various separators on the site. State Discharge Permit No. 83-DP-0215 covers this discharge.

R.M. Graham offered the following information: while employed at the Exxon Dundalk terminal facility (Dundalk and Gusryan Streets) (property presently owned by Baltimore City), he routinely witnessed weathering and burial of tank sediments. It was the usual practice to place tank bottoms on the ground surface of the dike areas and let the material weather for several months. A "danger" sign was customarily erected. Weathered sediments were "discharged" into the soil. Mr. Graham also stated that it was refinery practice to burn almost all waste products because of the economic incentives involved in producing heat used in the plant process.

. PERFORMANCE OF A PRELIMINARY ASSESSMENT

1. Background Information Review

a. Hydrology

1. Fault Zone N/A
2. Karst Zone N/A
3. 100 Yr. Flood Plain See attached map
4. Regulated Floodway N/A
5. Wetland N/A
6. Recharge Zone N/A
7. Soil Characteristics Arundel formation - clay facies 0.5 to 10 meters thick. Immediate shoreline is artificial fill.
8. Direction of GW/SW Flow Surface water enters storm drains and are discharged to Patapsco River. GW is an unconsolidated aquifer.
9. Depth to Ground Water Varies 200-300 feet
10. Use of GW 14 oil recovery wells are installed on Exxon property.
11. Aquifer Yield N/A
12. Distance to GW/SW Use On site
13. Recharge/Discharge Area N/A
14. Site Slope Flat coastal plain 0-5^{o} slope
15. SW Intakes N/A

(2)

b. Flora/Fauna

1. Endangered Species N/A

2. Indicator Species N/A

3. Critical Habitat N/A

c. Site History

1. State/Local Chronology of Events

See summary

2. Permits

a. NPDES 83-DP-0215

b. SPCC Plan Submitted with oil operations permit

c. State Permits None

d. Air Permits Gasoline terminal X00063-00092
Boiler X00063-00115-00116-00117
Asphalt X00063-00624

3. Legal Action

N/A

4. Sampling Results

N/A

d. Known or Alleged Hazards

1. Illness Clusters None

2. Cancer Studies None

3. Helath Dept. Records None

1C

A Preliminary Assessment of Exxon Company, USA 3801 Boston Street Baltimore, Maryland 21224

Final Report
August 1984

Prepared by: Maryland Waste Management Administration
201 West Preston Street
Baltimore, Maryland 21201

For: U.S. Environmental Protection Agency
Region III
Sixth and Walnut Streets
Philadelphia, Pennsylvania 19106

4. Fish Kills None

5. Worker/Non-worker Injury None

2. Administrative Information

a. Facility Name Exxon Company, USA

b. Address 3801 Boston Street, Baltimore, MD 21224

c. Latitude 76 ° 34"00 ' / longitude 39 ° 16" 36'

d. Responsibile Party

1. Owner Exxon Company, USA, P.O. Box 1280, Houston, Texas 77001

2. Realty Company N/A

3. Generators N/A

e. Type of Operation

1. Generator

a. Waste Type/Source/Amount

Leaded tank bottoms from tank cleaning operation. Amounts unknown

b. Waste Disposition Weathered and buried on site

2. Storage N/A

3. Treatment/Disposal N/A

a. Incineration

b. Landfill

c. Landfarm

d. Biological Treatment

e. Chemical Treatment

f. Deep Well Injection

g. Surface Impoundment

h. Other

f. Site Activity Status

1. Active _____

2. Inactive X

g. Personnel Present During Inspection

1. Name Richard Nock / Sid Schenning / R.M. Graham

2. Address (all) 3801 Boston Street, Baltimore, MD 21224

3. Work Phone (all) - (301)-563-5118 /

4. Title Terminal Mgr. / Terminal Supt. /Terminal Engr.

h. Inspection Information

1. Access

a. Warrant _____

b. Permission by Mr. Nock

2. Photographs

a. Permitted X

b. Prohibited _____

c. Other _____

3. Field Evaluation

a. Evidence of Contamination

1. Soil None

2. Runoff None

3. Spills None

4. Air Emmissions None

5. Erosion None

6. Ponding None

7. Charred Areas None

b. Maintainance, operation of run-off collection and control systems

Refer to appended oil recovery well production summary

c. Demographics (Refer to Field Trip Summary Report, Section IV., Site Observations.

WELL WITHIN [illegible] EXXON REFINERY SITE

EXXON COMPANY, U.S.A. - BALTIMORE TERMINAL

OIL RECOVERY WELL SYSTEM
MONTHLY OIL PRODUCTION SUMMARY

1ST QUARTER, 1983

(GALLONS OF OIL RECOVERED)

ACTIVE WELL NO.	CUMULATIVE TOTAL VOLUME RECOVERED (END OF 4TH QTR. 1982)	MONTHLY BREAKDOWN - 1ST QTR., 1983			CUMULATIVE TOTAL VOLUME RECOVERED (END OF 1ST QTR. 1983)
		JANUARY	FEBRUARY	MARCH	
1*	24,442	248	42	2	24,734
2**	1,193	25	23	0	1,241
5	18,489	883	-478	492	20,342
6	13,141	318	291	346	14,096
7	4,127	323	20	166	4,636
8	26,440	1,470	1,088	4,228	33,226
9	4,214	471	170	80	4,935
TOTALS	92,046	3,738	2,112	5,314	103,210

* Well #1 is presently out-of-service.

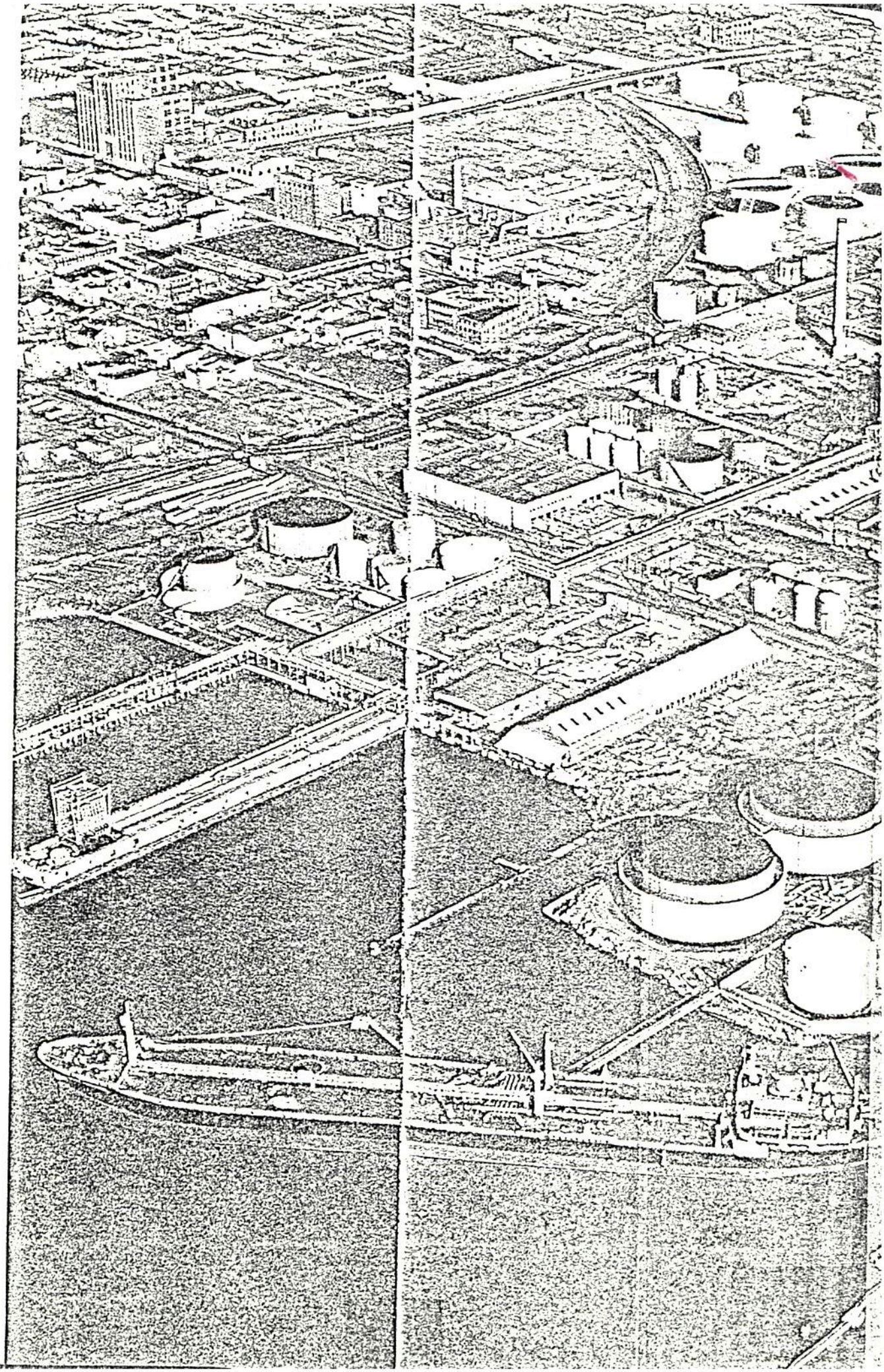
** Well #2 is in service, but oil production was negligible in March, 1983.

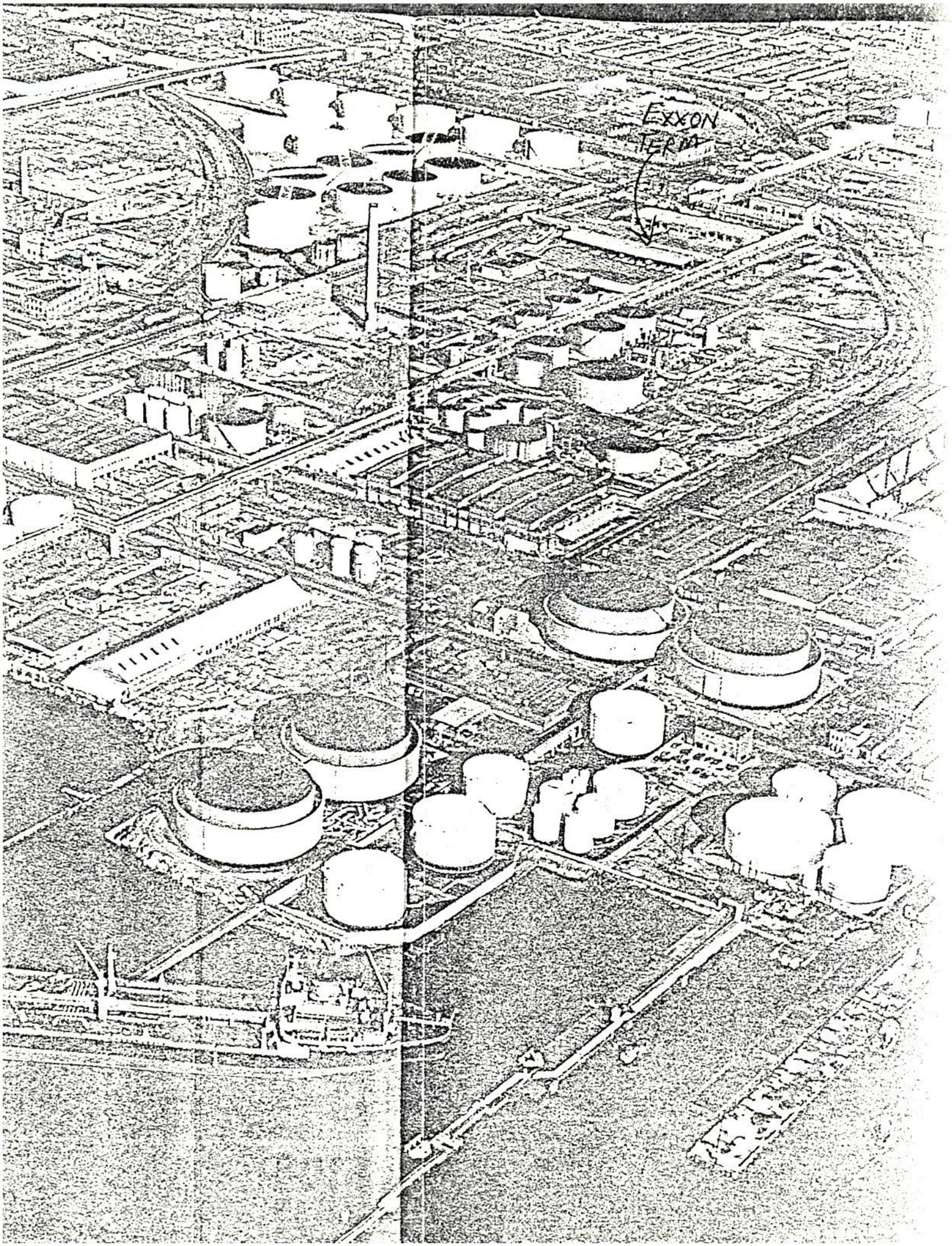
USGS
BALTIMORE, EAST, MD.
SE/4BALTO. 15' QUAD.
N3915 - w7630/7.5

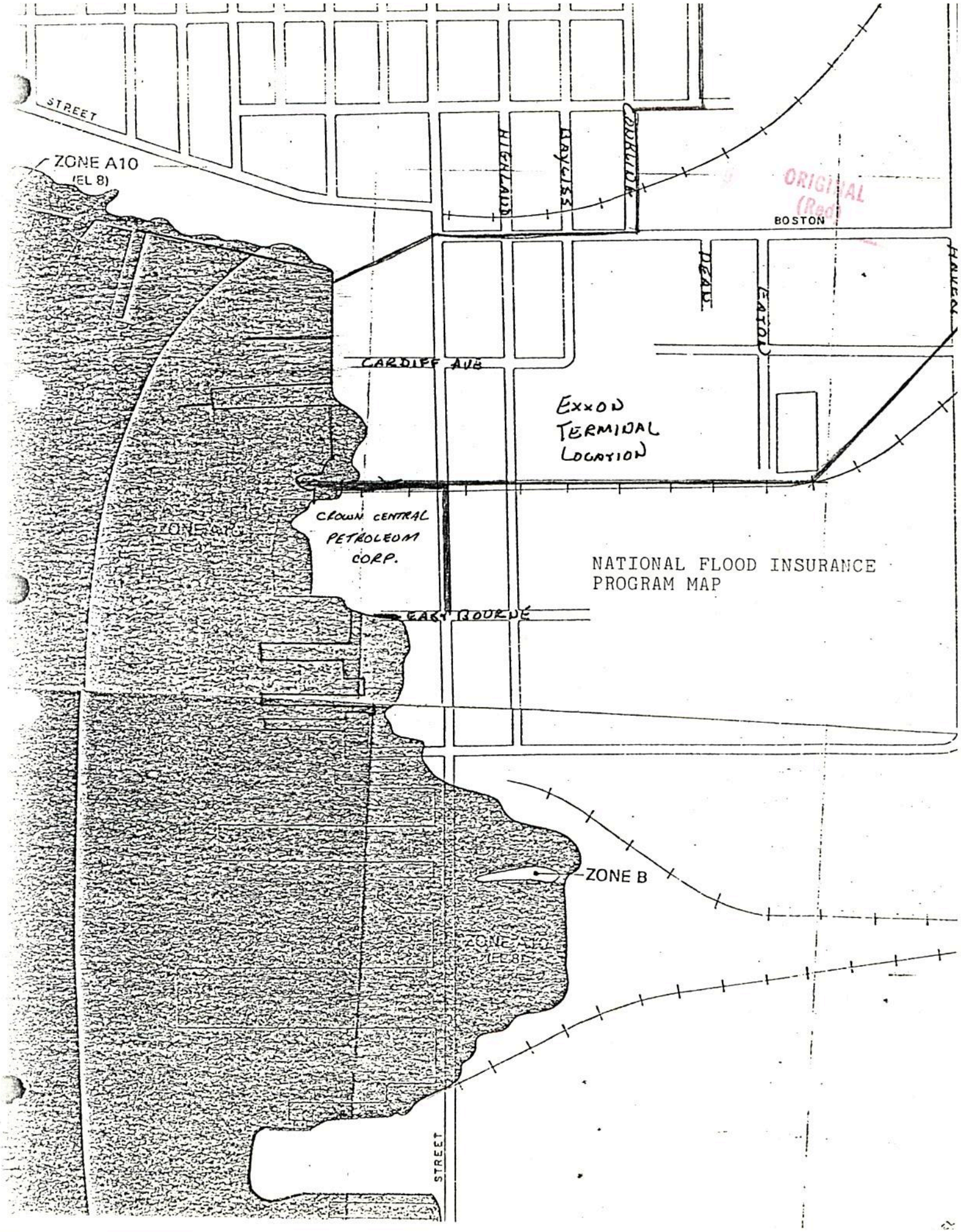
FERRY BAR CHANNEL (EAST SECTION)

with

	1982
)	5,500
2	672
7	1,562
0	1,160
7	157
5	475
6	826
1	141
	1,503
	139
2	192
5	125
1	381
5	235
4	284
0	680
2	902
	187
1	1,231
8	278
1	281
5	135
1	311
	350
	275
3	863
1	281
	175
	229
5	1,965
0	10,400
0	31,895




EXXON
TERM


STREET
ZONE A10
(EL 8)
HIGHLAND
BAYCLIFF
BURKLEY
BOSTON
DEAN
EATON
CARDIFF AVE
EXXON
TERMINAL
LOCATION
CROWN CENTRAL
PETROLEUM
CORP.
ZONE A10
NATIONAL FLOOD INSURANCE
PROGRAM MAP
EAST BOURNE
ZONE B
ZONE A
(EL 8)
STREET

ATTACHMENT B

METHODS OF DISPOSING OF SLUDGE FROM LEADED GASOLINE STORAGE TANKS

H. K. BALL

ETHYL CORPORATION

Preprint No. 28a-63—Subject to Correction

RELEASE AFTERNOON PAPERS TUESDAY, MAY 14

METHODS OF DISPOSING OF SLUDGE FROM LEADED GASOLINE STORAGE TANKS †

H. K. BALL *

ABSTRACT

For many years sludge from leaded gasoline storage tanks has been successfully disposed of by burial. Recently, inquiries have been received from a number of oil companies asking for an alternate method of sludge disposal. Available space for sludge pits is being exhausted, and in some areas high water tables offer disposal problems.

Various methods of sludge disposal were studied, including roasting, chemical treatment, leaching, etc. These methods, although effective, all have drawbacks. It was learned that the tetraethyllead would dissipate after spreading leaded sludge in a 3-in. layer. From tests that have been conducted to date, it appears that a weathering period of 30 days is adequate to reduce most sludges to a lead level of below 20 ppm, which is considered safe. Factors such as freezing weather could extend this period somewhat depending upon conditions.

Data are still being accumulated to further support this program.

Since the early 1930's, the potential toxicity of sludge from leaded gasoline storage tanks has been recognized. Therefore, it has been necessary to dispose of sludge by a method which would avoid harmful effects both from skin contact or inhalation of its vapors. Burial met these requirements.

In recent years, however, an increasing number of inquiries have been received from oil companies asking for an alternate method of sludge disposal because available space for sludge pits is being exhausted and in some areas high water tables create disposal problems.

In looking for alternate methods of sludge disposal, the basic requirements could be defined as follows:

1. Sludge should be reduced in the least possible time to a nonhazardous condition.

2. The method should be economical and should apply to tanks in all areas—refinery, terminal, bulk storage, etc.

3. The method should require no particular skill or technical assistance to perform it safely.

Possible methods for disposing of sludge were considered as follows:

1. *Chemical Methods* (applied after removing sludge from tank)

   a. Aqueous potassium permanganate.
   b. Sodium hypochlorite.
   c. Chlorine in acetic acid.
   d. Iodine solution.

2. *Thermal Methods*

a. Ignition: Place a thin layer of sludge into a shallow but long and wide trench, cover with kerosine, and ignite with a torch. The heating must be for a sufficiently long period of time to vaporize all liquid from the sludge and heat the dried mass to approximately 150 C.

b. Roasting: Place contaminated sludge on a large steel plate and heat with a flame to 150 C to 200 C. Heating may be applied in any manner.

3. *Physical Methods (Weathering Sludge):* Spread sludge in a thin layer and allow exposure to the elements.

4. *Combination of Preceding Methods:* Weathering followed by ignition or roasting.

5. *Miscellaneous Methods:* A host of other chemical decontaminants such as sulfuryl chloride in kerosine, hydrochloric acid, hydrogen peroxide, etc. were rejected because of secondary problems associated with use of these decontaminants.

Decontamination of sludge prior to removal from the gasoline storage tank (chlorine in the water wash) was rejected because of corrosion problems.

Advantages and Disadvantages of Various Methods

In the course of our investigations, it was agreed that:

1. Decontaminating sludge with chemicals (chlorine in acetic acid, iodine in potassium iodide solution, bleach, and potassium permanganate) is only partially effective and quite expensive. The chemicals react with other components of gasoline tank sludge and lose some of their effectiveness. Thorough mixing is essential for proper contact. This method is not considered feasible because of the difficulty of producing intimate contact of chemicals with sludge, the possible hazards of handling the chemicals, their cost, manpower requirements, and special equipment that may be required.

2. The most effective methods for decontaminating gasoline storage tank sludge are "thermal methods." Heating sludge to 200 C for 20 min after all moisture is removed reduces the tetraethyllead (TEL) content down to 0.00002 percent by weight. Heating may be carried out in a number of ways. However, the "thermal method" is only applicable when special facilities are available. The method may well require the removal of the sludge to a remote location involving rehandling of the material. Except under special circumstances, the economics do not appear good.

* Ethyl Corp., New York, N. Y.

† Presented to a session on operating practices during the 28th Midyear Meeting of the American Petroleum Institute's Division of Refining, in the Benjamin Franklin Hotel, Philadelphia, Pa., May 14, 1963; presiding: W. T. Askew, Sun Oil Co., Philadelphia, Pa.

and allowing it to "weather" has been proven an effective procedure for decontaminating sludge. Tests show that under Gulf Coast weather conditions, this method was superior to chemical treatment. This also proved true in mid-Continent area tests. In colder parts of the country weathering may be less effective as the sludge is in an inactive state because of low temperatures. However, as the weather moderates the weathering will continue.

Chemical Methods

The chemical methods were tested by removing portions (125 g each) from a large sludge sample and analyzing for TEL before and after treatment by methods shown in Table 1. The results from this test (Table 1) demonstrate that treating with halogens (which react instantly when in contact with TEL), potassium permanganate, and bleach considerably reduces the TEL content. *However, in no case did the decontaminants remove all TEL.*

A secondary problem presented itself in that all chemical decontaminants reacted with other components of sludge, presumably iron in its lower state of oxidation and organic petroleum compounds. This tends to use up the decontaminant.

Mixing sludge with chemical decontaminants appears to be necessary to improve contact with TEL. When potassium permanganate crystals were placed on the surface of sludge contained in a glass vessel, solution and diffusion of permanganate was extremely slow and not complete. Furthermore, the dilute permanganate solution was reduced by impurities in sludge more rapidly than it reacted with TEL.

Further tests to decontaminate sludge with potassium permanganate (1 lb permanganate to 99 lb sludge) proved unsuccessful. Even after stirring for 1 hr the TEL content was only reduced to 0.0022 percent by weight. Also, all potassium permanganate was reduced by this particular sludge sample. Based upon a cost of potassium permanganate at 26 cents per pound, this method appears to be quite expensive (approximately $8.50 per cubic yard of sludge for permanganate only. The equipment and labor costs would be even higher).

TABLE 1—Decontamination by Chemicals of Gasoline Storage Tank Sludge

Decontaminant	Active Part of Decontaminant, 1 Part to 99 Parts Sludge (Weight)	Contact Time (Days)	Unreacted TEL Percent of Sludge (Weight)
None (control sample)	...	...	0.0120
Chlorine in acetic acid	Chlorine	3	0.0022
Iodine–potassium iodide	Iodine	3	0.0006
Potassium permanganate ..	Permanganate	3	0.0023*
Bleach	Bleach	3	0.0049

* Constant stirring of a similar mixture for 1 hr resulted in a value of 0.0022 percent.

The addition of 0.1 percent by weight TEL to a single sample of sludge originally containing approximately 0.01 percent by weight TEL was readily decontaminated with chlorine in acetic acid to 0.0025 percent by weight of TEL. Apparently, TEL added to sludge is easy to decontaminate whereas TEL originally present in sludge is more difficult to decontaminate.

Thermal Methods

Thermal methods of *roasting* and *ignition* were tested and found to be effective, especially the former. A 300-g sample of sludge and a 2-lb sample of sludge were placed into steel trays and heated for 1 hr and 20 min. The temperature of the sludge remained below 100 C for the first hour (because of water on the sludge). During the next 20 min the temperature increased to 150 C on the surface and 200 C on the bottom layer.

The TEL content dropped to 0.00001 and 0.00002 percent by weight, respectively. This treatment appeared to be very promising because TEL and all other organic lead compounds are completely destroyed by heating.

The *ignition* method was tested by placing a 1-in. layer of wet sludge * in a tray and covering it with a thin layer of kerosine. The kerosine was then ignited. A relatively large volume of kerosine (1 volume kerosine to 4 volumes sludge) was needed to volatilize the moisture and reduce the TEL content to 0.0002 percent by weight. Two additions of kerosine were required to remove the moisture, and a third addition was necessary to increase the temperature of the sludge to a maximum of 145 C.

Burning air-dried sludge * with a kerosine and oil mixture reduced the TEL content to 0.00003 percent by weight. The use of kerosine only is not very satisfactory when using a deep bed of sludge (2 in.). Kerosine liquid and vapor prevent a rapid rise in the temperature of the sludge. The sludge bed acts as a wick, and if the temperature of the combustible vapor is not great enough, thermal decomposition of TEL is very slow. The use of a fuel with a higher boiling point is more effective for increasing the temperature of the sludge. For this reason, heating sludge with a flame or "roasting" is preferable to heating with a volatile solvent. The TEL content of a flame-heated sludge * sample (overhead flame) dropped to 0.00001 percent by weight.

Sludge-Weathering Method

In 1955 the Ethyl Corporation started a series of field tests involving the cleaning of leaded gasoline storage tanks. We were interested in what might be the maximum exposure hazard of lead vapors to personnel in a tank having contained leaded gasoline, and we were also interested in the nature of the sludge being removed from a tank. As a part of our study, sludge samples were sent to our chemical research and development laboratory in Baton Rouge for analysis. Sludge in glass bottles, standing in the laboratory before being analyzed, was found to stratify in layers composed of solids, gasoline, and water. It was further found that by centrifuging these samples, the TEL in the sludge can be removed.

* 0.012 percent by weight TEL.

diffused into the atmosphere. Further checking by the laboratory group showed that the level of lead in sludge exposed to the elements (with or without the sun being present) rapidly declined.

For this "weathering" process to be a satisfactory method of decontaminating sludge two questions had to be answered.

1. How low did the level have to be reduced to make the sludge safe?
2. How long would it take?

To answer the first of these it was reasoned that the sludge is safe if it will not contaminate the air above it. Tests were then made to see what the LIA (lead-in-air) values were in the air above "weathering" sludge. The results showed that the values are low at all times, even with no apparent wind. This meant that the sludge, as far as air contamination is concerned, is essentially safe as soon as it is spread in the open. To be on the safe side, however, Ethyl Corporation has set a figure at 20 ppm of organic lead as the limit in the

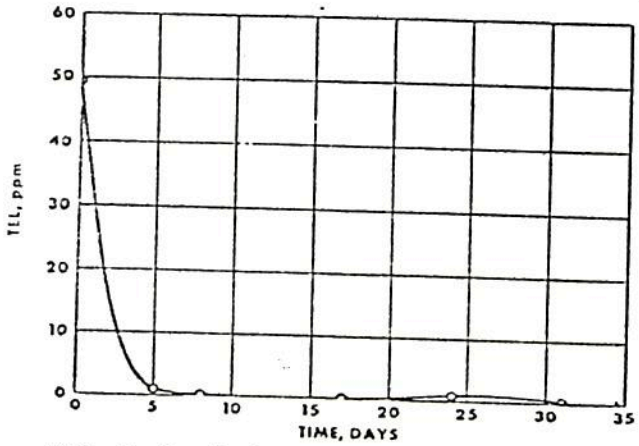


FIG. 1—One-Inch-Thick Sludge Weathered on Ground.

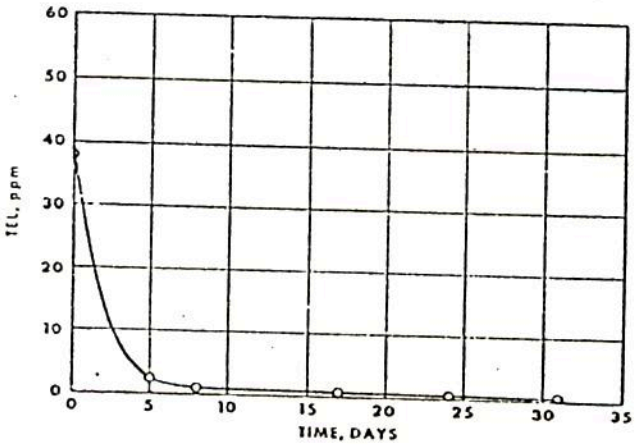


FIG. 2—Two-Inch-Thick Sludge Weathered on Ground.

it has been "weathered."

In the early studies, sludge levels of various thicknesses were tried over a period of time. These are shown in Fig. 1 through Fig. 4. In addition to placing these on the ground, some were placed on steel plate with no apparent difference. These were small-scale tests.

Following this, full-scale tests were carried out at tank cleanings, two of which are shown in Tables 2 and 3.

The LIA values remained almost constant for the duration of both tests even though the lead content of the sludge was disappearing (Table 3).

From the LIA data, it was concluded that there is no danger of inhaling a harmful quantity of lead, provided there is nothing to restrict normal air movement.

The lead content of the sludge in about 3 weeks time dropped 90 percent or more in the 4-in-thick patches (Fig. 3) and 98 percent or more in the 2-in.-thick patches (Fig. 2).

Based on data such as this, it was decided that it would be entirely satisfactory to dispose of the con-

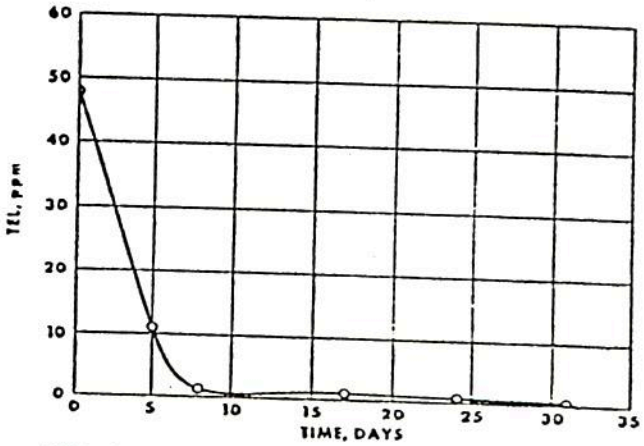


FIG. 3—Four-Inch-Thick Sludge Weathered on Ground.

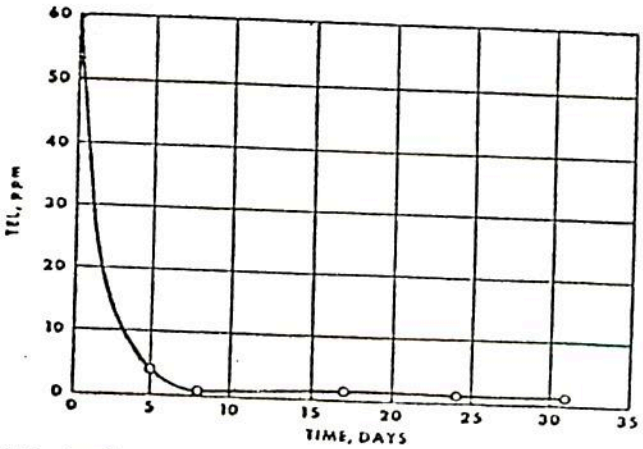


FIG. 4—Two-Inch-Thick Sludge Weathered on Steel Plate.

tamination in sludge by weathering for a period of 30 days.

As this program continues, considerably more data is being accumulated to substantiate our findings. To date all data obtained has proved our original conclusions to be correct.

The following procedure was developed for disposal of sludge so that a uniform method would be followed in arriving at a satisfactory completion of a sludge-weathering program:

1. Location of disposal area:

a. The site selected for sludge disposal should be in a remote part of the property and within property limits where it can be fenced off from the public. It should be located away from buildings. If the sludge is spread near the tank being cleaned, it should be outside the surrounding firewall, so that the possibility of gasoline vapors affecting the tank cleaning operations will be eliminated.

b. The disposal area should be located so that personnel working in, on, or around the tank will not get into the spread-out sludge.

c. It can be a bare ground, grass, or concrete surface.

d. It must be fairly smooth and well drained so that water will not stand on it.

e. The total area, whether in one or several patches, must be sufficiently large to permit spreading the sludge

TABLE 2—Typical Weathering Results

Weathering Time (Days)	TEL Content in Sludge in Parts Per Million	
	Two-Inch-Thick Patch	Four-Inch-Thick Patch
0	38.0	48.0
5	2.9	10.6
8	1.1	2.3
17	0.7	2.0
24	0.6	0.7
31	0.5	0.3

TABLE 3—Typical Lead-in-Air Readings

Weathering Time (Days)	Micrograms TEL per Cubic Foot of Air	
	Three Inches Above Sludge	Waist Level Above Sludge
1	1	1
2	1	1
5	1	1

in a layer not over 3 in. thick. The total area required will, of course, be determined by the amount of sludge in the tank.

f. It should be so located that air can circulate freely over the surface of the sludge. Exposure to the sun is desirable but not mandatory.

2. Remove sludge from the tank in the usual manner following the safety recommendations approved by the American Petroleum Institute.

3. The sludge can be moved from the tank to the spreading area in available plant equipment. Wheelbarrows, buckets, or other small containers may be used for moving it a short distance. Dump trucks, lugger buckets, etc. may be used for longer distances. The containers used should be metal. After use, they should be washed thoroughly with water.

4. The sludge can be spread with hoes, rakes, or shovels. It should be spread as uniformly as possible to a *maximum thickness of 3 in.* If the area permits it, a thinner spreading is desirable.

5. Personnel who handle and spread the sludge should be dressed in special clothing as recommended for tank cleaning. Masks will not usually be necessary unless there is no air movement and vapors can be detected by odor at face level.

6. After the spreading is completed the sludge patch or patches should be roped off and marked so that no one will walk through or stand in the sludge.

7. The spread sludge should be left for at least four weeks. After that it may be treated as any other nontoxic waste material. It is satisfactory to remove signs, fences, etc. and leave the sludge in the preselected area permanently. The four-week weathering period applies when the ambient temperature is above 32 F. Therefore, if temperatures under 32 F exist during the period of weathering, this period of subfreezing temperatures should not be included in the recommended four weeks of weathering.

8. Whenever the weathered sludge analyzes 0.002 percent by weight (20 ppm) organic lead or less, it may be considered safe and the sludge may then be treated as any other nonhazardous waste material.

To date we have examined over 100 weathered samples taken from tank cleanings and have definite results on 38. These weathered satisfactorily, the organic lead being reduced to less than 20 ppm. A number of samples had to be ruled out because we had no base line to start with, although we have reason to believe that these did weather satisfactorily.

This unquestionably is a radical departure from the early and original method of sludge burial. The new method was brought about by necessity; and, very fortunately, because of the curiosity of our people in our chemical research and development laboratories, we were able to bring to the field a method that, judging from figures received to date, is going to solve a lot of our sludge problems.

We are preparing a more detailed paper on some of the intricacies involved which, hopefully, should be published in several months.

ACKNOWLEDGMENT

The author wishes to acknowledge the assistance of Mr. Louis J. Snyder of the chemical research and development department of Ethyl Corporation who is responsible for directing the laboratory work which was done in connection with this study.

sludge disposal

One of two methods is commonly used for disposing of sludge from leaded-gasoline storage tanks. They are "burying" or "weathering". Both methods are recognized by API RP-2015. There are other effective methods, such as "thermal" methods, but they are not commonly used because special facilities are required.

BURYING—In this method a pit is dug either manually or by bulldozer. The sludge is dumped into the pit and then covered with 1 to 2 feet of fresh earth. This area should be adequately marked so that no one inadvertently uncovers the buried sludge. Experience indicates that buried organic lead compounds decompose very slowly to inorganic materials. If a ditch or trench is dug through the sludge pit, organic lead compounds may be uncovered.

WEATHERING—This method is safe, effective, and economical. Laboratory tests show that organic lead compounds in sludge when exposed to the elements will decompose to inorganic lead compounds. Laboratory and field tests show that if the procedures, as outlined in this section are followed, there will be no special air, soil, or water contamination problem. The basis for this is: (1) The total quantity of organic lead in a sludge weathering bed is small. Concentrations rarely exceed the normal range of 0.1 to 0.4 pounds organic lead per ton of sludge. (2) Regardless of the concentrations or total quantity of lead in the sludge weathering bed, the amount of organic lead exposed to the atmosphere at the surface of the weathering bed is very small. Lead-in-air tests taken over or immediately downwind of the weathering bed indicate that lead-in-air concentrations do not exceed the threshold limit value for organic lead. This indicates the atmosphere in the area is essentially safe from an occupational health hazard standpoint as soon as the sludge is spread. (3) Organic lead compounds are dissolved in the gasoline hydrocarbon fractions of the sludge and do not migrate into water or soil. Thus, the physical properties of organic lead in sludge in the weathering beds are such that vaporization, absorption in water or soil do not constitute a health problem.

ETHYL CORPORATION
PETROLEUM CHEMICALS DIVISION

"WEATHERING" PROCEDURE FOR DISPOSAL OF SLUDGE FROM LEADED GASOLINE STORAGE TANKS

1. Location of disposal area:
   a. The site selected for sludge disposal should be in a remote part of the tank owners property and within property limits where it can be fenced off from tl public. It should be located away from buildings. If the sludge is spread near t tank being cleaned, it should be outside the surrounding firewall, so that the possibility of gasoline vapors affecting the tank cleaning operations will be eliminated.
   b. The disposal area should be located so that personnel working in, on, or around the tank will not get into the spreadout sludge.
   c. It can be a bare ground, grass or concrete surface.
   d. It must be fairly smooth and well drained so that water will not stand on it.
   e. The total area, whether in one or several patches, must be sufficiently large to permit spreading the sludge in a layer not over 3" thick. The total area required will, of course, be determined by the amount of sludge in the tank.
   f. It should be so located that air can circulate freely over the surface of the sludge. Exposure to the sun is desirable but not mandatory.

2. Remove sludge from the tank in the usual manner following the safety recommendations approved by API.

3. The sludge can be moved from the tank to the spreading area in available plant equipment. Wheelbarrows, buckets or other small containers may be used for moving it a short distance. Dump trucks, lugger buckets, etc., may be used for longer distances. The containers used should be metal. After use, they should be washed thoroughly with water.

4. The sludge can be spread with hoes, rakes or shovels. It should be spread as uniformly as possible to a *maximum thickness of three inches*. If the area permits it, a thinner spreading is desirable.

5. Personnel handling and spreading the sludge should be dressed in special clothing as recommended for tank cleaning. Normally, masks will not be necessary if there is air movement.

6. After the spreading is completed the sludge patch or patches should be roped off and marked so that no one will walk through or stand in the sludge.

7. While sludge will normally weather within four weeks when the sludge temperature is above 32 degrees F, lead-in-sludge tests should be made before declaring it a nontoxic waste material. The number of days during which sludge temperatures are 32 degrees F or lower should be excluded from the four-week weathering period. If after the four-week weathering period the organic lead content is 20 parts per million or less, 0.002 weight percent, the sludge may then be treated as any other nontoxic waste material. It is then satisfactory to remove signs and fences. The sludge should remain in the preselected area.

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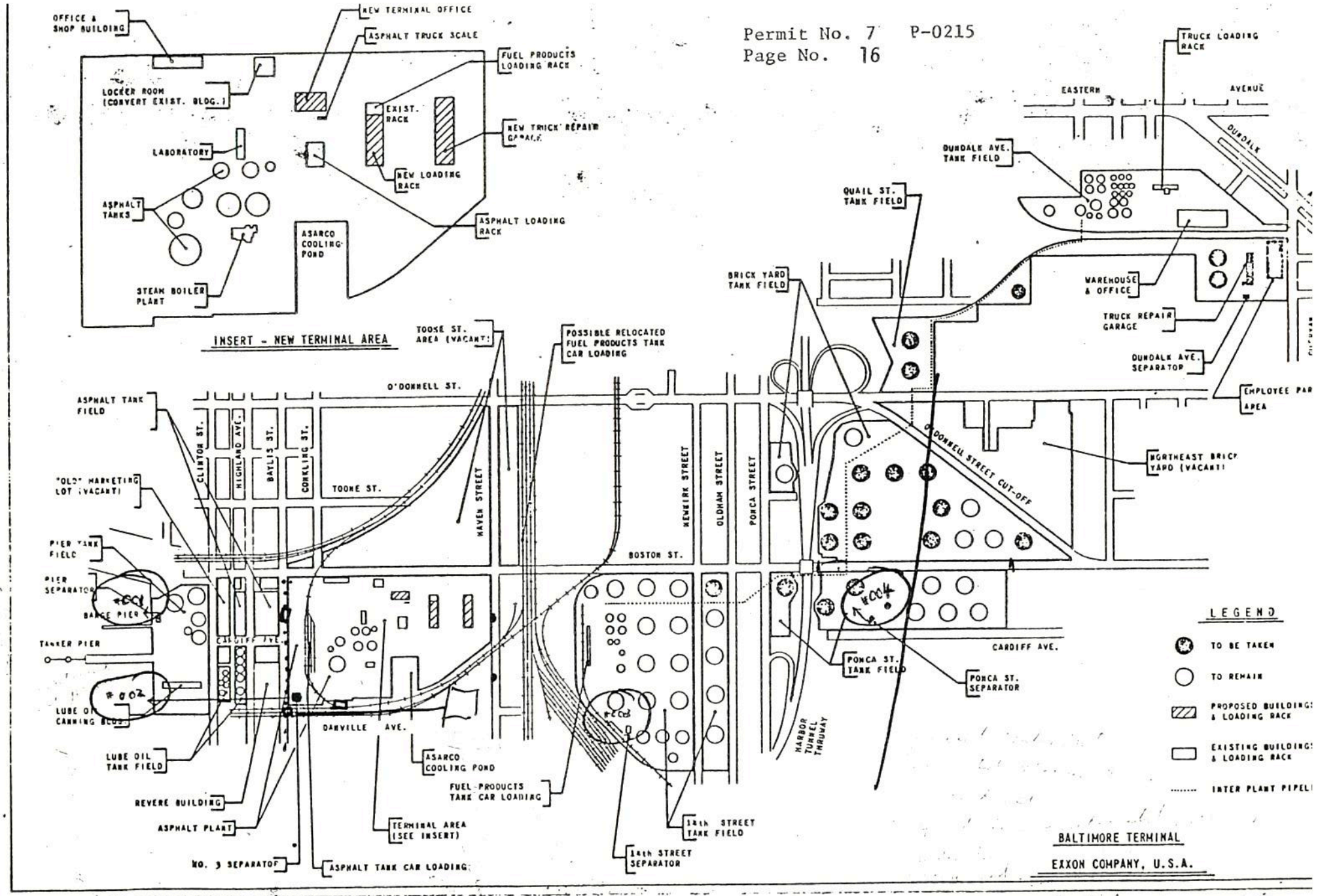

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
MD	

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- XX C. SLUDGE
- ☐ D. OTHER — Emulsion (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

- TONS: ____
- CUBIC YARDS: Unknown
- NO. OF DRUMS: ____

03 WASTE CHARACTERISTICS (Check all that apply)

- XX A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☐ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- XX G. FLAMMABLE
- XX H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		
OLW	OILY WASTE	Unknown		
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
SLU	Separator Sludge	78-00-02	Weathering & Burial	Unknown	
SLU	Tank Bottoms	78-00-02	Weathering & Burial	Unknown	
SLU	Heat Exchanger Sludge	7440-47-3	Weathering & Burial	Unknown	
Olw	Slop Oil Emulsion	7440-47-3	Weathering & Burial	Unknown	

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

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EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: MD | 02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 XX A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
As reported by Exxon, a hazardous material was buried on site

01 ☐ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 XX E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: Unkonwn
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 XX F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: Unknown (Acres)
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 XX H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE: _____) XX POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
See "A"

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: _____
02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
MD	

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ K. DAMAGE TO FAUNA
04 NARRATIVE DESCRIPTION (Include name(s) of species)

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ L. CONTAMINATION OF FOOD CHAIN
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES
(Spills/runoff/standing liquids/leaking drums)
03 POPULATION POTENTIALLY AFFECTED: _____

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☒ N. DAMAGE TO OFFSITE PROPERTY
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

01 ☒ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED

See "A"

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING
04 NARRATIVE DESCRIPTION

02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

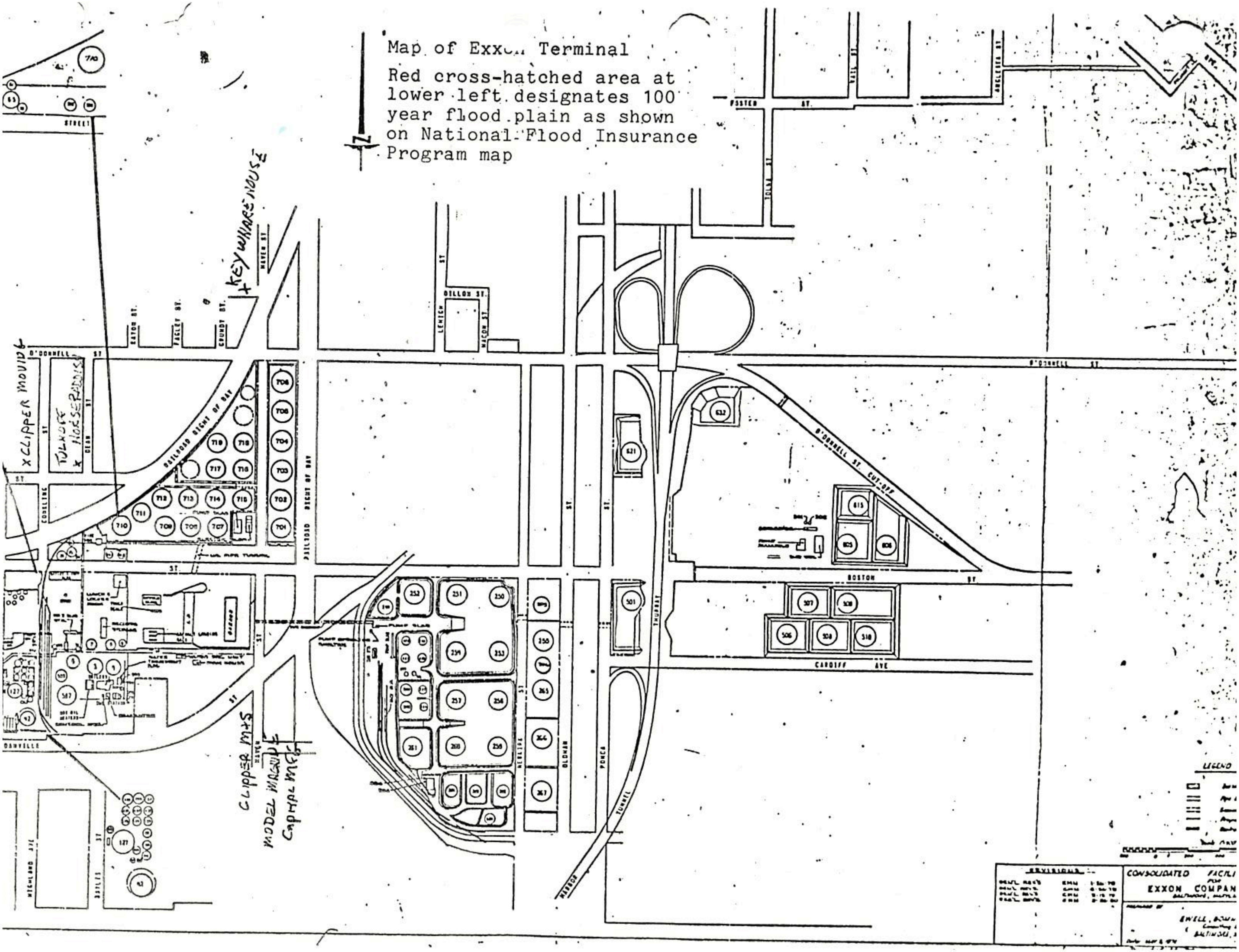
III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

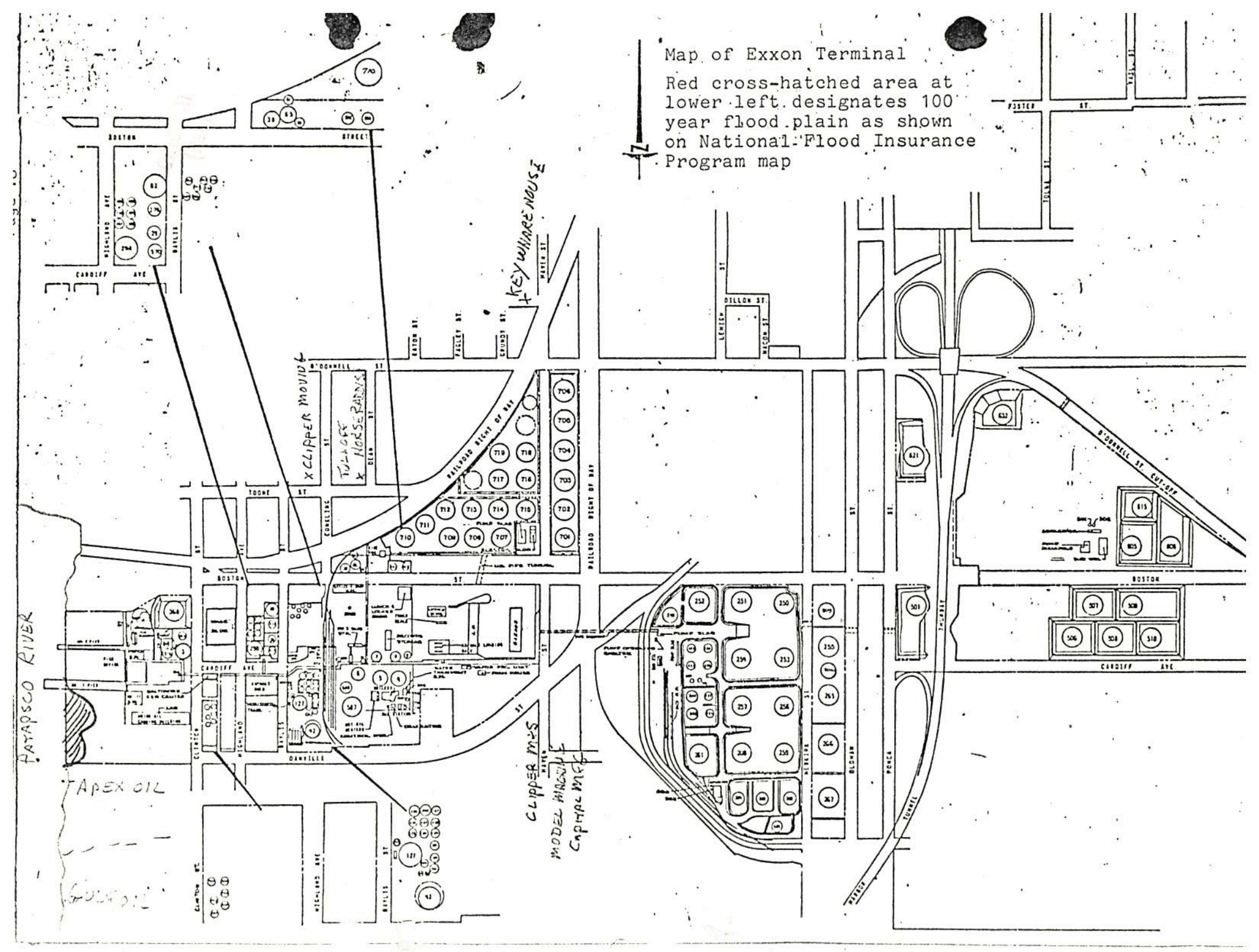
CERCLA Report

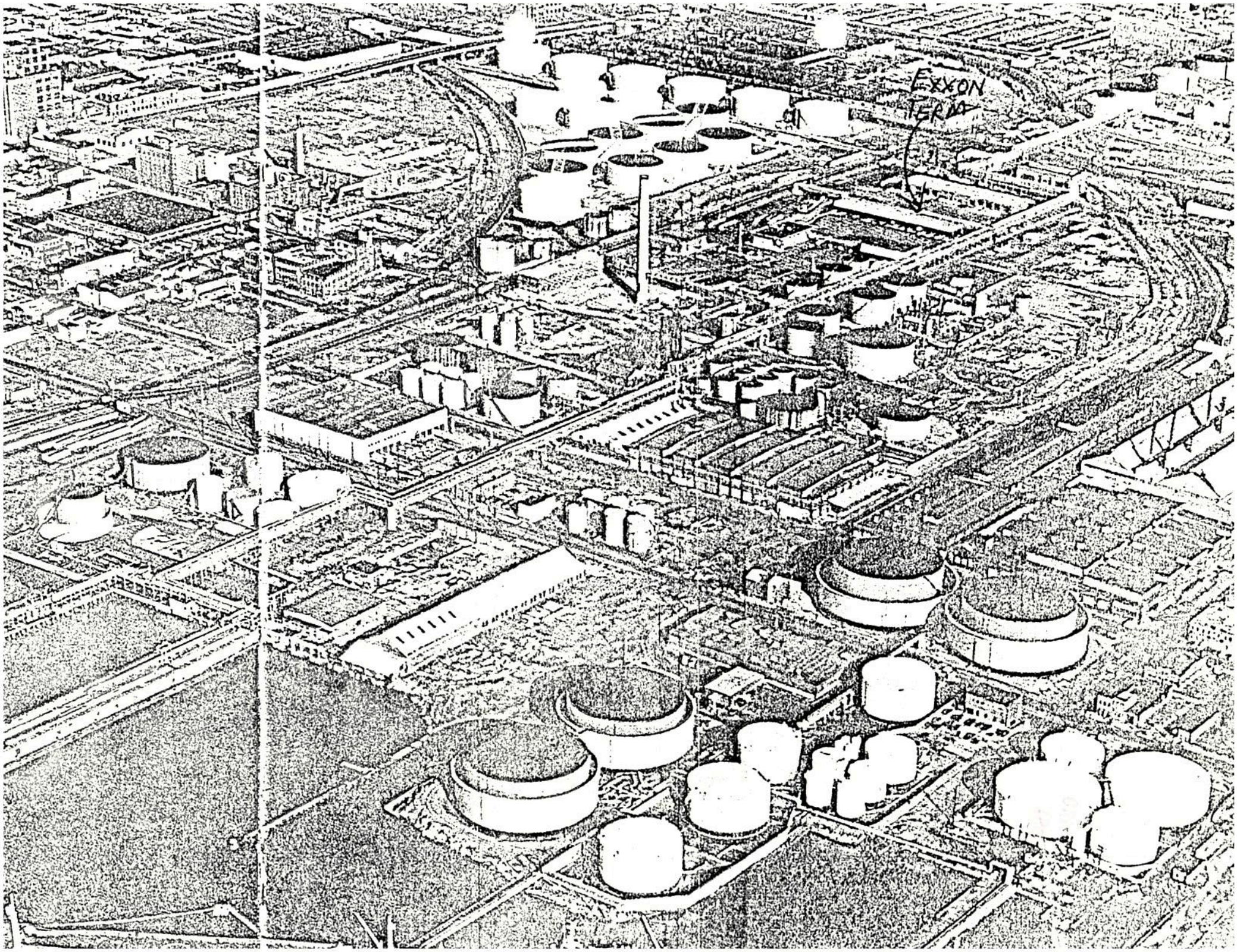
EPA FORM 2070-12 (7-81)



Map of Exxon Terminal

Red cross-hatched area at lower left designates 100 year flood plain as shown on National Flood Insurance Program map


Map of Exxon Terminal
Red cross-hatched area at lower left designates 100 year flood plain as shown on National Flood Insurance Program map
KEY WHARF HOUSE
CLIPPER MOVED
TILLOFF HORSE PARKS
RAILROAD RIGHT OF WAY
PATAPSCO RIVER
APEX OIL
CLIPPER MILLS
MODEL WHARF
CAPITAL WHARF
BOSTON ST
CARDIFF AVE
O'DONNELL ST
DILLON ST
FOSTER ST
TOWNSEND ST
O'DONNELL ST. CUT-OFF


EXXON
TERM